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2000

EPA Superfund
Record of Decision:

WEST VIRGINIA ORDNANCE (USARMY)
EPA ID: WVD980713036
OU 11
POINT PLEASANT, WV
05/09/2000

Final
Record of Decision

for

Former Sellite Manufacturing Area
(Operable Unit 11)

at the

West Virginia Ordnance Works
Mason County, West Virginia

Prepared for:

U.S. Army Corps of Engineers
Huntington District
Huntington, West Virginia

Prepared by:

IT Corporation
312 Directors Drive
Knoxville, Tennessee

May 2000

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No Action with monitoring.

1.1 Site Name and Location

Former Sellite Manufacturing Area
Operable Unit 11
West Virginia Ordnance Works
Mason County, West Virginia

1.2 Statement of Basis and Purpose

This decision document presents the selected remedial action for the Former Sellite Manufacturing Area at the West Virginia Ordnance Works (WVOW) in Mason County, West Virginia. This determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substance Pollution Contingency Plan (NCP). The decision is based on the administrative record for this Site.

This document has been prepared for the U.S. Department of the Army, the lead agency for response actions at the WVOW. The project is administered by the U.S. Army Corps of Engineers (USACE), Huntington District.

The USACE and the U.S. Environmental Protection Agency (EPA), Region III have obtained concurrence from the West Virginia Division of Environmental Protection (WVDEP) for the selected remedy.

1.3 Description of the Selected Remedy

The remedy selected in this Record of Decision (ROD) addresses the contamination associated with the soils and groundwater at the Former Sellite Manufacturing Area, also designated as Operable Unit 11 (OU-11) or "the Site." The selected remedy for OU-11 is "no action" with

annual monitoring of the groundwater for 5 years. Since the lead agency would be responsible for future groundwater monitoring, it would maintain the right of entry onto the property.

No remedial action is required to protect human health or the environment from chemicals in the soil and groundwater at OU-11. Actual or threatened releases of hazardous substances from the Site do not indicate an imminent and substantial or future endangerment to public health and welfare or the environment; therefore no further investigations or remedial action is required.

1.4 Declaration Statement

The ROD for OU-11 summarizes information presented in greater detail in the Hazardous Toxic and Radiological Waste Remedial Investigation Report, the Human Health Risk Assessment Baseline Risk Assessment Report, the Ecological Risk Assessment Report Addendum, and other documents contained in the administrative record file for this Site. Based on this information, a remedy was selected that addresses the contamination of the soils and groundwater and that is protective of human health and the environment.

The remedy selected is no-action. No remedial action is necessary to protect human health and the environment.

29 March 2000
Date

Col. Dana Robertson, District Engineer
U.S. Army Engineer District, Huntington
Huntington, West Virginia

5/9/00
Date

Abraham Ferdas, Director
Hazardous Site Cleanup Division
U .S. Environmental Protection Agency, Region III
Philadelphia, Pennsylvania

The West Virginia Division of Environmental Protection concurs in the selection of the remedy described in this ROD.

Ken Ellison

Ken Ellison, Chief
Office of Environmental Remediation
West Virginia Division of Environmental Protection
Charleston, West Virginia

4/21/00
Date

2.0 Decision Summary

2.1 Site Name, Location, and Description

The former WVOW site is located on the east bank of the Ohio River in Mason County, West Virginia, approximately 6 miles north of Point Pleasant, West Virginia (Figure 2-1). The WVOW encompasses approximately 8,323 acres, of which 2,788 acres is currently designated as the Clifton F. McClintic Wildlife Station and is operated by the West Virginia Department of Natural Resources (WVDNR). The former WVOW is currently owned by the U.S. Army, private land holders, and state and local agencies.

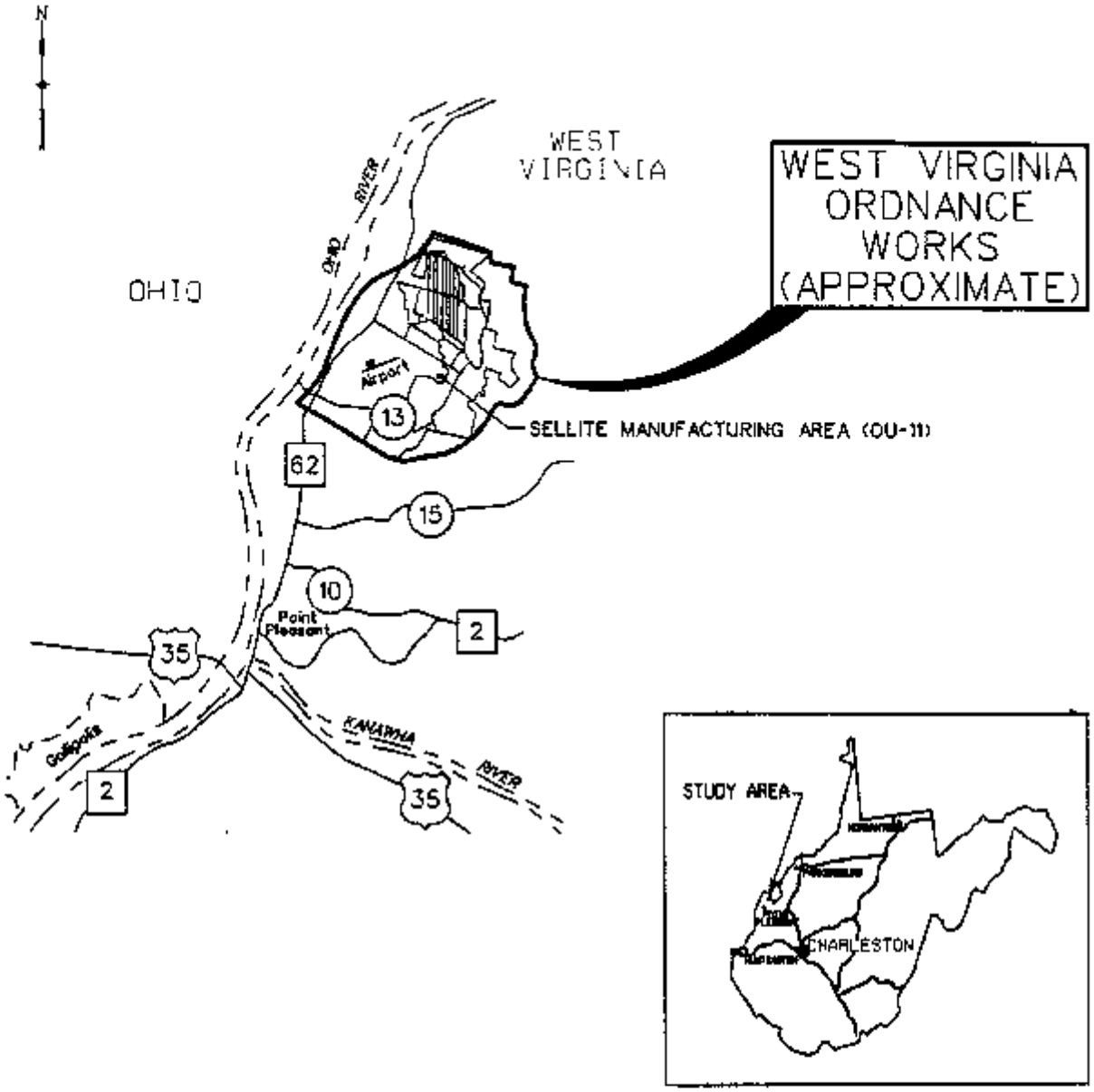
The Former Sellite Manufacturing Area is centrally located in the WVOW, and lies northwest of the Former Trinitrotoluene (TNT) Manufacturing Area. The Site (OU-11) is situated on the south side of County Road 12 (Wadsworth Road), approximately 1.5 miles southeast of State Route 62.

The Sellite Manufacturing Plant (Building 307A) was supported by other facilities that included a soda ash storage building (Building 307B), a sulfur storage facility (Building 307C), and a box factory and storage facility (Building 814). Figure 2-2 shows the locations of the various structures at the Site.

The topography for OU-11 is predominantly level with a gentle slope towards the southeast. Surface elevations range from 625 to 630 feet, mean sea level. The Site is surrounded by wooded areas. No surface water exists in the OU-11 area.

Two water supply wells are located on the OU-11 property. One well, MFC-01, was installed by the Mason Furniture Company (MFC) for fire protection and is currently out of service. The other well, MFC-02, was used as the potable water supply for MFC and was most recently used by the West Virginia Mulch Company for wetting mulch during hot weather and cleaning vehicles.

The WVOW, which includes the Former Sellite Manufacturing Area, was listed on the National Priorities List (NPL) in 1983.



VICINITY MAP

FIGURE 2-1
LOCATION MAP
WEST VIRGINIA ORDNANCE WORKS
MASON COUNTY, WV

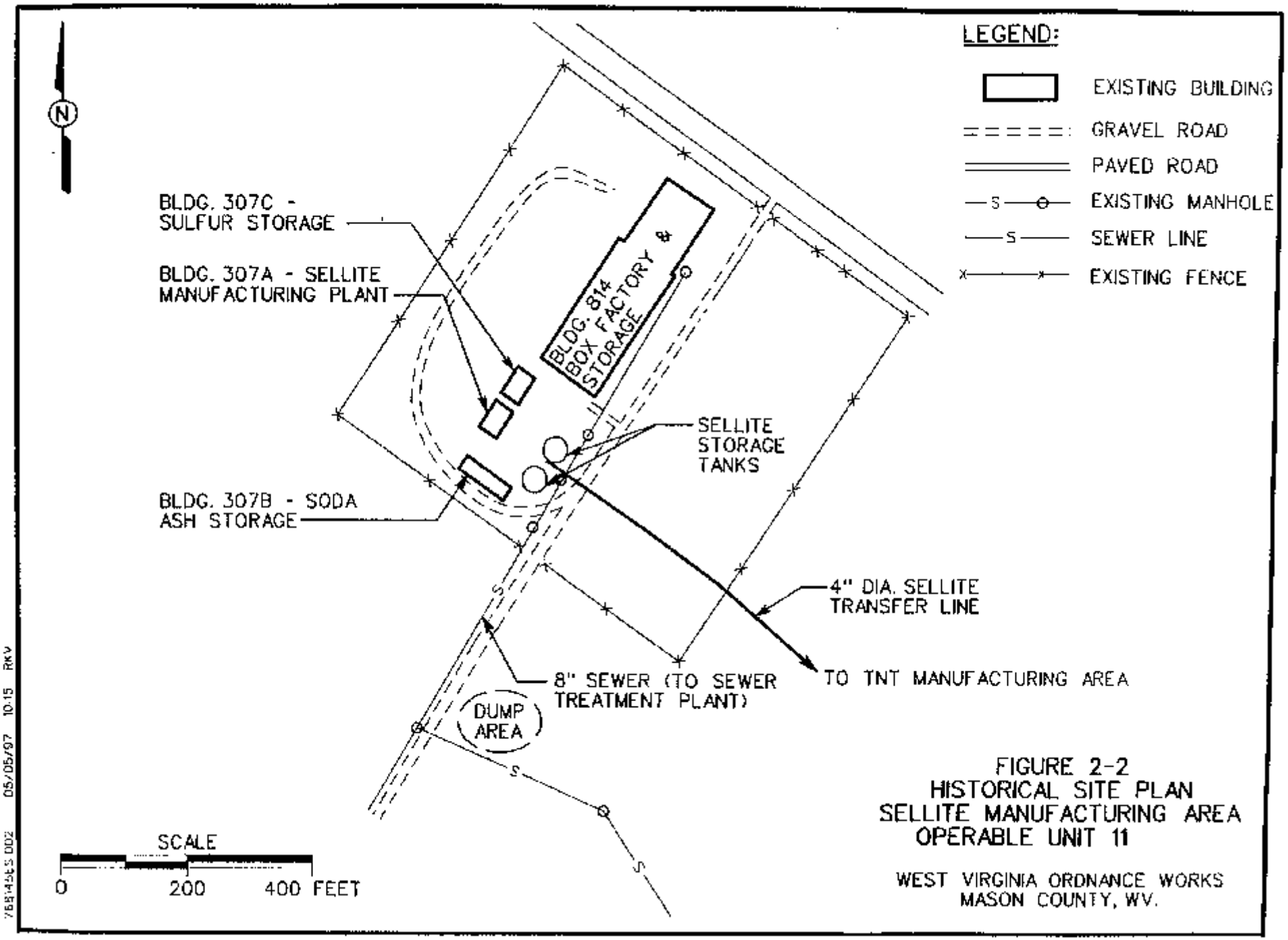


FIGURE 2-2
HISTORICAL SITE PLAN
SELLITE MANUFACTURING AREA
OPERABLE UNIT 11

WEST VIRGINIA ORDNANCE WORKS
MASON COUNTY, WV.

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2.2 Site History and Enforcement Activities

The construction of the WVOW was authorized on December 13, 1941, and construction began March 16, 1942. TNT production began October 21, 1942, and construction was completed September 10, 1943. The facility was designed with a production capacity of 720,000 pounds of TNT per day, operating 7 days per week, 3 shifts per day. The maximum attained production was 1,324,700 pounds of TNT in a 24-hour period during May 1945. TNT production was suspended at WVOW on August 15, 1945, following the end of World War II.

2.2.1 History of Site Activities

Sellite (sodium sulfite) was manufactured at the Sellite Manufacturing Plant (Building 307A) from 1942 to 1945 by the U.S. Army. Supporting facilities consisted of the soda ash storage building (Building 307B) and a sulftir storage facility (Building 307C). In addition, a box factory and storage facility (Building 814) was located at the Site. Figure 2-2 shows the locations of the various structures at the Site.

During the manufacture of TNT at WVOW, sellite was used for the washing and purification of tri-oil as one of the final steps in producing TNT. Sellite was manufactured through the combination of soda ash and sulfur, which involved the use of a sulfur melting pit and a sulfur furnace. The materials were combined in two batch tanks within the sellite plant, and the liquor produced was pumped to two sellite storage tanks located southeast of the plant.

During the initial operation of WVOW, sellite solution was transported from the storage tanks to the TNT Manufacturing Area by truck. However, because of the inefficiencies of this operation, a 4-inch-diameter steel line was installed in 1944 to supply sellite to the washer/flaker houses in the TNT Manufacturing Area, and the trucks were taken out of service.

Since the suspension of TNT manufacturing at WVOW in August of 1945, and the declaration of the WVOW Site as surplus in December of 1945, the Former Sellite Manufacturing Area has had several uses. The Site was initially used by the MFC for the manufacture of ftirniture from 1948 through the mid-1970s, operating out of Building 814. The Former Sellite Manufacturing Area property was most recently leased from the private land owner by the West Virginia Mulch Company for the manufacture of mulch. Site activities included the receipt of raw materials, manufacture and storage of mulch, packaging of mulch, and the loading of tractor trailers for

transport of packaged mulch. These operations ceased in 1996, and the entire property is now vacant. In 1999, the EPA Remedial Project Manager (RPM) conducted a walk-through inspection of the Site and discovered approximately thirty-two 55-gallon drums of unknown material at various locations around the Site. The private property owner had no knowledge concerning most of the drums. The RPM contacted EPA's removal program, and a removal action was performed. Thirty-two drums and a small quantity of contaminated soil were removed and disposed of by EPA.

2.2.2 Previous Investigations

In April 1990, Environmental Science and Engineering (ESE), under contract to the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), conducted a surface and subsurface investigation at the Sellite Manufacturing Area. The investigation consisted of collecting 20 grab samples, or surface samples, and collecting one sample each from two boreholes for monitoring wells designated as MFC-03 and MFC-04. The results of this investigation indicated that neither nitroaromatics/explosive compounds nor organic compounds were detected. However, during a July 1990 sampling event, 2,4-dinitrotoluene (DNT) was detected in well MFC-01.

A focused remedial investigation (RI) was conducted by the U.S. Army Engineer District, Huntington, at OU-11 from January to March 1994 to verify and expand the database established in the April 1990 investigation by USATHAMA. The objectives of the RI were to identify the specific chemical contaminants and concentrations present in the groundwater and shallow soils; to identify and evaluate the source, nature, and extent of contamination; and to evaluate chemical migration pathways and Site characteristics that influence the migration of Site-related contaminants. To achieve the objectives presented above, the following field activities were conducted at OU-11

- Installation of two deep (lower sand and gravel layer) and three shallow (intermediate sand and gravel layer) monitoring wells

- Groundwater sampling of five new monitoring wells (SAGW-01, SAGW-02, SAGW-03, SAGW-04D, and SAGW-05D) and two existing monitoring wells (MFC-01 and MFC-03)

- Drilling and sampling of 16 shallow (to 4 feet) and 23 deep (to 7 feet) soil borings at the Sellite Manufacturing Area

- Conducting a geophysical survey to locate and trace the 4-inch diameter sellite transfer line

- Excavating a trench adjacent to the sellite line, and collecting a soil sample below the pipe and a water sample inside the pipe

The analytical data from the RI was used in the risk assessment to select chemicals of potential concern (COPC), which are presented in Section 2.6.

The three shallow wells were installed to characterize groundwater quality hydraulically down-gradient and laterally from wells MFC-01, 02, 03, and 04 located in the Sellite Manufacturing Area. The two deep wells were placed south of the Sellite Manufacturing Area within OU-11 to provide information on the possible interconnection between the shallow and deep aquifers.

During the RI, many of the USATHAMA locations were resampled by drilling additional shallow and deep soil borings. Additional soil samples were also collected from areas not previously investigated, including the dump area (Figure 2-2), a drainage ditch located east of the manufacturing plant, and identifiable areas of stressed vegetation.

The results of the RI are documented in the Report for the HTRW Remedial Investigation of the Former Sellite Manufacturing Area, Operable Unit 11, West Virginia Ordnance Works, Mason County, West Virginia (IT, May 1995).

2.2.3 Enforcement Actions

There have been no enforcement actions taken at the Former Sellite Manufacturing Area, Operable Unit 11.

2.3 Summary of Community Participation

In accordance with CERCLA Sections 113(k)(2)(B)(i-v) and 117, the USACE held a public comment period from April 15, 1999 through May 15, 1999 on the Proposed Plan (PP) for the Former Sellite Manufacturing Area (OU-11). The PP was made available to the public by placing a copy of the document in a public repository located at the Mason County Public

Library in Point Pleasant, West Virginia. The notice of availability was published in the *Point Pleasant Register* on April 8, 1999. In addition, a public meeting was held on April 15, 1999 at 7:00 p.m. in the Army National Guard Armory, Point Pleasant, West Virginia. At this meeting, representatives from the USACE, the U.S. EPA, and the WVDEP were prepared to answer questions on the remedy under consideration; however, no members of the public attended the meeting. A response to comments received during this period is included in the Responsiveness Summary, which is part of this ROD.

2.4 Scope and Role of the Operable Unit

For the purpose of environmental remediation, the WVOW has been divided into various areas, known as operable units (OUs), to more effectively address the concerns presented by each area. There are 13 designated OUs at WVOW. These OUs and the portion of the facility that each addresses are as follows:

- OU-1: Portion of TNT Manufacturing Area, Former Waste Water Process Lines, Former TNT Remelt Facility (Burning Grounds)
- OU-2: Draining and Capping the Red Water Reservoirs
- OU-3: Draining and Capping the Yellow Water Reservoir and vicinity
- OU-4: Pumping and Treating Contaminated Groundwater at OU-2, OU-3, and OU-5
- OU-5: Draining and Capping the Pond 13 /Wet Well Area
- OU-6: Wetlands Mitigation for OU-1, OU-2, OU-3, and OU-5
- OU-7: Point Pleasant Landfill
- OU-8: TNT Manufacturing Area/Old Yellow Water Reservoir/Wash-Out Area Soils
- OU-9: TNT Manufacturing Area/Old Yellow Water Reservoir/Wash-Out Area Groundwater
- OU-10: South Acids Area/Toluene Storage/WVOW Shop Areas (soils, all associated piping and pits, groundwater)

- OU-11: Sellite Manufacturing Area (Sellite Manufacturing Plant ditch, soils, groundwater, and all piping)

- OU-12: North and South Power Houses and Vicinity (soils, ash pits, disposal pile, all piping)

- OU-13: Pantasote Site (TCE-plume investigation, led by potentially responsible parties, near Point Pleasant water supply wellfield)

This ROD addresses the soils, groundwater, drainage ditch, and sellite transfer line for OU-11, the Former Sellite Manufacturing Area. The remedy selected for OU-11 is described in Section 2.7. The objective of the remedy for OU-11 is to prevent the exposure of human and ecological receptors to environmental contamination exceeding acceptable risk-based levels.

2.5 Summary of Site Characteristics

2.5.1 Sellite Transfer Line

The field activities of the RI included a geophysical survey to locate the sellite transfer line that ran from the Former Sellite Manufacturing Area to each of the 12 washer/flaker houses located in the Former TNT Manufacturing Area. The sellite transfer line measures approximately 300 linear feet from the sellite storage tanks to the eastern boundary of the OU-11 area. Analytical results from the soil sample collected adjacent to the sellite transfer line indicates that the sellite line has not resulted in, nor contributed to, contamination of soils at that location. Also, the low levels of contaminants detected in the water sample collected from the pipe were all less than risk-based screening concentrations (RBSCs), which are chemical concentrations that are considered to be protective of human health. Because the water sample collected from the pipe contained only negligible levels of contaminants, additional sampling along the sellite transfer line was not performed.

2.5.2 Soils

The soils investigation at OU-11 indicates the presence of low levels of semivolatile organic compounds (SVOC) and inorganic contaminants. Several inorganics, specifically aluminum, arsenic, and manganese, are present at concentrations exceeding their respective RBSCs in soils throughout the area. However, the concentrations of these metals are comparable to background

concentrations, suggesting that they are naturally occurring in soils and are not likely due to Site-related activity.

Two SVOCs (benzo[a]pyrene and dibenzo[a,h]anthracene) were found to be present in Site soils at the dump area (Figure 2-2) at concentrations greater than their RBSCs. The SVOCs are not attributable to chemicals known to be used in the sellite manufacturing process.

Sulfate and sulfur were present at elevated concentrations in soils at two locations. Molecular sulfur was detected in Site soils at a depth of 6 to 7 feet adjacent to the Former Sellite Manufacturing Plant and sulfur storage building. Sulfate was detected at a high concentration in surface soils adjacent to the diesel fuel pump. Soils in. this area exhibited visible staining from past spills.

2.5.3 Groundwater

The analytical results from the groundwater investigation indicate the presence of low levels of nitroaromatic, organic, and inorganic contaminants. However, some of the detected contamination is not directly attributable to the sellite manufacturing process and is likely due to other sources.

Detected nitroaromatic compounds were found at concentrations that do not exceed RBSCs. Their most likely source appears to be the Former Yellow Water Reservoir and associated sewer lines.

Arsenic, lead, and manganese were detected in groundwater at concentrations exceeding RBSCs but were comparable to background concentrations, suggesting that these metals are naturally occurring in groundwater.

Organic compounds such as benzene, 1,2-dichloroethane, bromodichloromethane, chloroform, dibromochloromethane, and bis(2-ethylhexyl)phthalate were detected in specific monitoring wells screened in the intermediate and deep aquifers at levels exceeding RBSCs.

Table 2-1

Statistical Summary and Chemical of Potential Concern Selection from Surface Soil Sample Analyses OU11, West Virginia Ordnance Works, Mason County, West Virginia

Chemical (ug/L)	Frequency of Detection	Range of Detected Concentration	Range of Detection Limits	Arithmetic Mean	Upper Confidence Limit		Exposure Point Concentration	Arithmetic Mean of Background	Risk-Based Scrng. Concentration[a]		COPC? [b]
Inorganics											
Arsenic	2 / 7	9.7 - 32	2 - 10	6.67	32.0	c	32.0	25.8	0.045		Yes
Calcium	1 / 7	10700 - 10700	20 - 20	26841			10700	36324	Nutrient		No(b)
Copper	1 / 7	26.4 - 26.4	10 - 10	8.06			26.4	15.69	150		No(c)
Lead	3 / 7	3.4 - 64.5	2 - 3	11.16	64.5	c	64.5	13	15	d	Yes
Manganese	7 / 7	89.8 - 981	2 - 2	587	833	e	833	520	84		Yes
Organics											
1,2-Dichloroethane	1 / 7	0.6 - 0.6	0.5 - 0.5	0.30	0.60	c	0.60		0.12		Yes
2,4-dinitrotoluene	3 / 5	0.07 - 0.3	10 - 10	2.09			0.30		7.3		No(c)
2,6-Dinitrotoluene	1 / 7	0.05 - 0.05	10 - 10	4.29			0.05		3.7		No(c)
2-Nitrophenol	1 / 7	10 - 10	10 - 10	5.71			10.0		NA		No(d)
4-Nitrophenol	1 / 7	12 - 12	25 - 25	12.4			12.0		230		No(c)
Benzene	2 / 7	0.1 - 2	0.5 - 0.5	0.48	2.00	c	2.00		0.36		Yes
Bromodichloroemethane	1 / 7	0.2 - 0.2	0.5 - 0.5	0.24	0.20	c	0.20		0.17		Yes
Chloroform	2 / 7	0.2 - 0.7	0.5 - 0.5	0.31	0.70	c	0.70		0.15		Yes
Dibromochloromethane	1 / 7	0.4 - 0.4	0.5 - 0.5	0.27	0.40	c	0.40		0.13		yes
Ethylbenzene	1 / 7	0.1 - 0.1	0.5 - 0.5	0.23			0.10		130		No(c)
bis(2-Ethylhexyl) phthalate	6 / 7	3 - 48	10 - 10	16.3	91.5	f	48.0		4.8		Yes
Phenol	1 / 7	85 - 85	10 - 10	16.4			85.0		2200		No(c)
Toluene	2 / 7	0.2 - 0.5	0.5 - 0.5	0.28			0.50		75		No(c)
m&p-Xylenes	2 / 7	0.5 - 0.5	0.5 - 0.5	0.32			0.50		1200		No(c)
o-Xylene	2 / 7	0.3 - 0.3	0.5 - 0.5	0.26			0.30		140		No(c)

[a] ***risk-Based Concentration Table, January-June 1995***, EPA Region III, Philadelphia, PA, adjusted to reflect a cancer risk of 10^{-6} and HI of 0.1.

[b] Comparison with background was not considered in COPC selection.

[C] Nonparametric UCL (or maximum detected concentration) based on Shapiro-Wilks distribution test.

[d] ***Drinking Water Regulations and Health Advisories***, February 1996,U.S. EPA, Office of Water, Washington, DC.

[e] 95% UCL based on a normal distribution.

[f] 95% UCL based on a lognormal distribution.

NA = No RBSC available.

COPC = Chemical of potential concern.

No(b) = Essential nutrient.

No(c) = Chemical concentration is less than the risk-based screening concentration.

No(d) = No toxicity values to evaluate.

Table 2-2

Statistical Summary and Chemical of Potential Concern Selection from Surface Soil Sample Analyses OU11, West Virginia Ordnance Works, Mason County, West Virginia

Chemical (mg/kg)	Frequency of Detection	Range of Detected Concentration	Range of Detection Limits	Arithmetic Mean	Upper Confidence Limit	Exposure Point Concentration	Arithmetic Mean of Background	Risk-based screening Concentration[a]	COPC?[b]
Inorganics									
Aluminum	23 / 39	3380 - 17300	4 - 4	10638	11492 c	11492	16092	7800	Yes
Arsenic (carcinogenic)	39 / 39	1.4 - 27.4	1 - 1	7.91	9.20 d	9.20	7.88	0.43	Yes
Barium	23 / 39	30 - 272	0.2 - 0.2	90.5		272	95	550	No(c)
Beryllium	38 / 39	0.24 - 1.7	0.1 - 0.24	0.61	0.708 e	0.708	0.79	0.15	Yes
Cadmium	1 / 39	2.1 - 2.1	0.5 - 1.3	0.61		2.10		3.9	No(a)
Cobalt	38 / 39	3 - 19.1	1 - 2.1	9.04		19.1	14.5	470	No(c)
Copper	39 / 39	3.9 - 88.5	1 - 1	13.8		88.5	16.3	310	No(c)
Iron	23 / 39	12800 - 36100	1 - 1	20123		36100	25373	2300	No(b)
Lead	39 / 39	5.5 - 267	0.3 - 0.3	24.1		267	13.4	400 f	No(c)
Manganese	23 / 39	67 - 917	0.2 - 0.2	350	653 d	653	635	39	Yes
Nickel	23 / 39	7.1 - 19.2	2 - 4.2	11.9		19.2	21.8	160	No(c)
Nitrate/nitrite	5 / 39	2.6 - 3	2.5 - 2.5	2.22		3.00		780	No(c)
Selenium	6 / 39	0.53 - 2.2	0.43 - 12	0.39		2.20	0.26	39	No(c)
Silver	8 / 37	1.2 - 5	0.5 - 1.2	0.85		5.00	0.63	39	No(c)
Vanadium	39 / 39	9.1 - 32.9	1 - 1	21.6		32.9	25.6	55	No(c)
Zinc	32 / 39	7.9 - 218	0.5 - 0.5	40.1		218	56.8	2300	No(c)
Organics									
2,4-Dinitrotoluene	1 / 39	0.15 - 0.15	0.36 - 2	0.23		0.150		16	No(a)
2-Butanone	7 / 39	0.002 - 0.022	0.011 - 0.014	0.01		0.022		4700	No(c)
2-Hexanone	1 / 39	0.003 - 0.003	0.011 - 0.014	0.01		0.003		NA	No(a)
2-Methylnaphthalene	2 / 39	0.047 - 0.14	0.36 - 2	0.23		0.140		310	No(c)
4-Methyl-2-pentanone	1 / 39	0.001 - 0.001	0.011 - 0.014	0.01		0.001		630	No(a)
Acenaphthene	1 / 39	0.082 - 0.082	0.36 - 2	0.23		0.082		470	No(a)
Acenaphthylene	4 / 39	0.056 - 0.15	0.36 - 2	0.23		0.150		NA	No(d)
Acetone	16 / 39	0.004 - 0.15	0.011 - 0.013	0.03		0.150		780	No(c)
Anthracene	4 / 39	0.04 - 034	0.36 - 2	0.23		0.340		2300	No(c)
Benzene	10 / 39	0.01 - 0002	0.011 - 0.014	.005		0.002		22	No(c)
Benzo(a)anthracene	8 / 39	0.044 - 0.49	0.36 - 2	0.24		0.490		0.88	No(c)
Benzo(a)pyrene	11 / 39	0.04 - 0.44	0.36 - 2	0.22	0.195 d	0.195		0.088	Yes
Benzo(b)fluoranthene	13 / 39	0.047 - 0.89	0.36 - 2	0.25	0.195 d	0.195		0.88	No(c)
Benzo(g,h,i)perylene	9 / 39	0.04 - 0.39	0.36 - 2	0.22		0.390		NA	No(d)
Benzo(k)fluoranthene	5 / 39	0.041 - 0.085	0.36 - 2	0.22		0.085		8.8	No(c)
bis(2-Ethylhexyl)phthalate	12 / 39	0.042 - 7	0.36 - 2	0.62		7.00		46	No(c)
Butyl benzyl phthalate	1 / 39	0.048 - 0.048	0.36 - 2	0.23		0.048		1600	No(a)
Carbazole	3 / 39	0.044 - 0.078	0.36 - 2	0.22		0.078		32	No(c)

Table 2-2

Statistical Summary and Chemical of Potential Concern Selection from Surface Soil Sample Analyses OU11, West Virginia Ordnance Works, Mason County, West Virginia

Chemical (mg/kg)	Frequency of Detection	Range of Detected Concentration	Range of Detection Limits	Arithmetic Mean	Upper Confidence Limit	Exposure Point Concentration	Arithmetic Mean of Background	Risk-based Screening Concentration [a]	COPC? [b]
Carbon disulfide	3 / 39	0.003 - 0.008	0.36 - 2	0.01		0.008		780	No(c)
Chrysene	10 / 39	0.043 - 0.58	0.36 - 2	0.23		0.580		88	No(c)
Di-n-butyl phthalate	1 / 39	0.049 - 0.049	0.36 - 2	0.23		0.049		780	No(a)
Di-n-octyl phthalate	3 / 39	0.21 - 0.9	0.36 - 2	0.24		0.900		160	No(c)
Dibenzo(a,h)anthracene	3 / 39	0.048 - 0.13	0.36 - 2	0.23	0.195 d	0.130		0.088	Yes
Dibenzofuran	1 / 39	0.13 - 0.13	0.36 - 2	0.23		0.130		31	No(a)
Ethylbenzene	1 / 39	0.009 - 0.009	0.011 - 0.014	0.01		0.009		780	No(a)
Fluoranthene	12 / 39	0.049 - 1.2	0.36 - 2	0.26		1.20		310	No(c)
Fluorene	1 / 39	0.11 - 0.11	0.36 - 2	0.23		0.110		310	No(a)
Indeno(1,2,3-cd)pyrene	5 / 39	0.069 - 0.38	0.36 - 2	0.23		0.380		0.88	No(c)
Methylene chloride	16 / 39	0.001 - 0.021	0.012 - 0.013	0.01		0.021		85	No(c)
Naphthalene	2 / 39	0.11 - 0.2	0.36 - 2	0.23		0.200		310	No(c)
Phenenthrene	8 / 39	0.04 - 0.84	0.36 - 2	0.24		0.840		NA	No(d)
Phenol	1 / 39	0.17 - 0.17	0.36 - 2	0.23		0.170		4700	No(a)
Pyrene	12 / 39	0.042 - 0.76	0.36 - 2	0.24		0.760		230	No(c)
Toluene	37 / 39	0.002 - 0.21	0.011 - 0.012	0.04		0.210		1600	No(c)
Total xylenes	7 / 39	0.001 - 0.046	0.011 - 0.014	0.01		0.046		16000	No(c)

[a] ***Risk-Based Concentration Table, January-June 1995***, EPA Region III, Philadelphia, PA, adjusted to reflect a cancer risk of 10^{-6} and HI of 0.1.
[b] Comparison with background was not considered in COPC selection.
[c] 95% UCL based on a normal distribution.
[d] Nonparametric upper confidence limit.
[e] 95% UCL based on a lognormal distribution
[f] ***Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil***, Memorandum from L.R. Goldman, Assistant Administrator, to EPA Regional Directors, dated July 14, 1994.
COPC = Chemical of potential concern.
NA = No RBSC available.
No(a) = Frequency of detection is less than 5%.
No(b) =Chemical is an essential nutrient unlikely to cause toxic effects at this level in this medium.
No(c) = Chemical concentration is less than the risk-based screening concentration.
No(d) = No toxicity values to evaluate.

Table 2-3

Statistical Summary and Chemical of Potential Concern Selection from Total Soil Sample Analyses OU11, West Virginia ordnance Works, Mason County, West Virginia

Chemical (mg/kg)	Frequency of Detection	Range of Detected Concentration	Range of Detection Limits	Arithmetic Mean	Upper Confidence Limit		Exposure Point Concentration	Arithmetic Mean of Background	Risk-based Screening Concentration [a]		COPC? [b]
Inorganics											
Aluminum	65 / 102	3120 - 19300	4.0 - 4.0	11360	12262	c	12260	16092	7800		Yes
Antimony	1 / 84	12.0 - 12.0	5.0 - 13.5	4			12.0		3.1		No(a)
Arsenic	102 / 102	0.61 - 28.2	1.0 - 1.0	7.46	7.60	d	7.60	7.88	0.43		Yes
Barium	66 / 102	23.2 - 272	0.2 - 0.2	73.2			272	95	550		No(c)
Beryllium	100 / 102	0.24 - 2.5	0.1 - 0.24	0.64	0.630	d	0.630	0.79	0.15		Yes
Cadmium	2 / 102	1.3 - 2.1	0.5 - 1.3	0.60			2.10		3.9		No(a)
Chromium	1 / 102	26.3 - 26.3	1.0 - 1.0	13.9			26.3	14.9	39		No(a)
Cobalt	97 / 102	2.3 - 38	1.0 - 4.8	9.60			38.0	14.5	470		No(c)
Copper	102 / 102	2.8 - 88.5	1.0 - 1.0	14.7			88.5	16.3	310		No(c)
Iron	64 / 102	2610 - 84000	1.0 - 1.0	21602			84000	25373	2300		No(b)
Lead	102 / 102	4.4 - 267	0.3 - 0.3	17.4			267	13.4	400	e	No(c)
Magnesium	1 / 102	1230 - 1230	5.0 - 5.0	1290			1230	2642	Nutrient		No(a)
Manganese	65 / 102	9.3 - 1310	0.2 - 0.2	308.3	294	d	294	635	39		Yes
Nickel	65 / 102	5.3 - 24.3	2.0 - 9.4	12.3			24.3	21.8	160		No(c)
Nitrate/nitrite	7 / 102	2.6 - 3.8	5.0 - 5.0	3.11			3.80		780		No(c)
Selenium	7 / 102	0.53 - 2.2	0.42 - 12	0.29	260	d	2.20	0.26	39		No(c)
Silver	26 / 102	1.1 - 5.0	0.5 - 2.6	1.31			5.00	0.63	39		No(c)
Sodium	2 / 102	61.6 - 923	10 - 10	161.6			923	107.9	Nutrient		No(a)
Vanadium	102 / 102	6.6 - 51.2	1.0 - 1.0	22.1			51.2	25.6	55		No(c)
Zinc	83 / 102	7.9 - 218	0.5 - 0.5	37.2			218	56.8	2300		No(c)
Organics											
1,2-Dichloroethane	1 / 102	0.019 - 0.019	0.011 - 2	0.01			0.019		7		No(a)
2-Butanone	22 / 102	0.001 - 0.033	0.007 - 0.014	0.01			0.033		4700		No(c)
2-Hexanone	3 / 102	0.003 - 0.003	0.007 - 0.014	0.01			0.003		NA		No(a)
2-Methylnaphthalene	2 / 102	0.047 - 0.14	0.36 - 2	0.21			0.140		310	f	No(a)
2,4-Dinitrotoluene	1 / 102	0.075 - 0.075	0.36 - 2	0.21			0.075		16		No(a)
4-Methyl-2-pentanone	2 / 102	0.001 - 0.001	0.007 - 0.014	0.01			0.001		630		No(a)
Acenaphthylene	3 / 102	0.042 - 0.13	0.36 - 2	0.21			0.130		NA		No(a)
Acetone	54 / 102	0.004 - 0.15	0.011 - 0.013	0.03			0.150		780		No(c)
Anthracene	7 / 102	0.04 - 0.34	0.36 - 2	0.21			0.340		2300		No(c)
Benzene	19 / 102	0.001 - 0.004	0.007 - 0.014	.010			0.004		22		No(c)
Benzo(a)anthracene	13 / 102	0.044 - 0.49	0.36 - 2	0.21			0.490		0.88		No(c)
Benzo(a)pyrene	15 / 102	0.04 - 0.44	0.36 - 2	0.20	0.195	d	0.195		0.088		Yes
Benzo(b)fluoranthene	17 / 102	0.045 - 0.89	0.36 - 2	0.21	0.195	d	0.195		0.88		No(c)
Benzo(g,h,i)perylene	11 / 102	0.04 - 0.39	0.36 - 2	0.20			0.390		NA		No(d)
Benzo(k)fluoranthene	7 / 102	0.041 - 0.085	0.36 - 2	0.20			0.085		8.8		No(c)
bis(2-Ethylhexyl)phthalate	20 / 102	0.042 - 7	0.36 - 2	0.36			7.00		46		No(c)

Table 2-3

Statistical Summary and Chemical of Potential Concern Selection from Total Soil Sample Analyses OU11, West Virginia Ordnance works, Mason County, West Virginia

Chemical (mg/kg)	Frequency of Detection	Range of Detected Concentration	Range of Detection Limits	Arithmetic Mean	Upper Confidence Limit	Exposure Point Concentration	Arithmetic Mean of Background	Risk-based Screening Concentration [a]	COPC? [b]
Butyl benzyl phthalate	1 / 102	0.048 - 0.048	0.36 - 2	0.21		0.048		1600	No(a)
Carbozole	4 / 102	0.044 - 0.078	0.36 - 2	0.21		0.078		32	No(a)
Carbon disulfide	3 / 102	0.003 - 0.008	0.011 - 0.014	0.01		0.008		780	No(a)
Chloroethane	1 / 102	0.014 - 0.014	0.007 - 0.014	0.01		0.014		3100	No(a)
Chrysene	15 / 102	0.043 - 0.58	0.36 - 2	0.20		0.580		88	No(c)
Di-n-butyl phthalate	8 / 102	0.046 - 0.07	0.36 - 2	0.20		0.070		780	No(c)
Di-n-octyl phthalate	4 / 102	0.21 - 0.9	0.36 - 2	0.21		0.900		160	No(a)
Dibenzo(a,h)anthracene	3 / 102	0.048 - 0.13	0.36 - 2	0.21		0.130		0.088	No(a)
Dibenzofuran	1 / 102	0.13 - 0.13	0.36 - 2	0.21		0.130		31	No(a)
Ethylbenzene	3 / 102	0.001 - 0.009	0.011 - 0.014	0.01		0.009		780	No(a)
Fluoranthene	18 / 102	0.046 - 1.2	0.36 - 2	0.22		1.20		310	No(c)
Fluorene	2 / 102	0.11 - 0.53	0.36 - 2	0.21		0.530		310	No(a)
Indeno(1,2,3-cd)pyrene	5 / 102	0.069 - 0.38	0.36 - 2	0.21		0.380		0.88	No(a)
Methylene chloride	46 / 102	0.001 - 0.028	0.012 - 0.013	0.01		0.028		85	No(c)
Naphthalene	2 / 102	0.11 - 0.2	0.36 - 2	0.21		0.200		310	No(a)
Phenanthrene	13 / 102	0.04 - 0.84	0.36 - 2	0.21		0.840		NA	No(d)
Phenol	1 / 102	0..17 - 0.17	0.36 - 2	0.21		0.170		4700	No(a)
Pyrene	18 / 102	0.04 - 0.76	0.36 - 2	0.21		0.760		230	No(c)
Sulfate	80 / 102	100 - 2000	200 - 200	308		2000		NA	No(d)
Toluene	97 / 102	0.002 - 0.21	0.022 - 0.024	0.03		0.210		1600	No(c)
Total xylenes	17 / 102	0.001 - 0.046	0.011 - 0.014	0.01		0.046		16000	No(c)

[a] ***Risk-Based Concentration Table, January-June 1995***, EPA Region III, Philadelphia, PA, adjusted to reflect a cancer risk of 10^{-6} and HI of 0.1.
[b] Comparison with background was not considered in COPC selection.
[c] 95% UCL based on a lognormal distribution.
[d] Nonparametric upper confidence limit.
[e] ***Guidance on Residential Lead-Based Paint, Lead-Contaminated Dust, and Lead-Contaminated Soil***, Memorandum from L.R. Goldman, Assistant Administrator, to EPA Regional Directors, dated July 14, 1994.
[f] Based on RBSC for naphthalene.
COPC = Chemical of potential concern.
NA = No RBSC available.
No(a) = Frequency of detection is less than 5%.
No(b) =Chemical is an essential nutrient unlikely to cause toxic effects at this level in this medium.
No(c) = Chemical concentration is less than the risk-based screening concentration.
No(d) = No toxicity values to evaluate.

Sulfate was detected in one monitoring well near the Former Sellite Manufacturing Plant at a concentration greater than that present in other groundwater samples examined from throughout WVOW. Currently, there is no RBSC established for sulfate.

Chemicals found at concentrations exceeding RBSCs are identified as chemicals of potential concern (COPCs). A summary of the chemicals identified at the Site and those identified as COPCs can be found in Tables 2-1 through 2-3. A more detailed description of the nature and extent of contamination at the Site is presented in the RI report for OU-11.

2.6 Summary of Potential Site Risks

2.6.1 Introduction

This section summarizes the baseline risk assessment performed for OU-11 at WVOW and provides a basis for taking no action. The baseline risk assessment evaluated the potential health impact of contaminants detected in soil and groundwater to various hypothetical receptors if no action is taken to remediate the Site. The risk assessment consisted of two steps: (1) a comparison of the concentration of chemicals detected at the Site to RBSCs to identify COPCs and (2) a quantitative characterization of the potential health risks associated with exposure to the COPCs by various receptors. The methodology and assumptions used in performing the baseline risk assessment for OU-11 are based on EPA guidance. The details of the risk assessment are documented in *Human Health Risk Evaluation-Baseline Risk Assessment, Former Sellite Manufacturing Area, Operable Unit 11*.

2.6.2 Contaminant Identification

The RI at OU-11 was conducted to determine the source, nature, and extent of contamination resulting from past activities at the Site. Potentially contaminated media at OU-11 include groundwater, surface soil, and subsurface soil.

Data collected during the RI were evaluated to confirm acceptable technical quality. Usability criteria included assessment of sample collection methods, data quality objectives, analytical methods, and quality control requirements. The acceptable analytical data were used to identify potential Site-related contaminants and estimate chemical concentrations to be used in the quantitative risk assessment.

To focus the assessment on the chemicals that may contribute significantly to overall risk, the following conservative criteria were applied to eliminate chemicals from the list of COPCs:

- Chemicals detected infrequently (less than 5 percent of the samples from a given medium), provided the chemicals were at low levels and their presence was not expected based on professional judgment.

- Chemicals whose concentrations were below the RBSC, which corresponds to an increased lifetime cancer risk (ILCR) of 1×10^{-6} and noncancer hazard quotient (HQ) of 0.1. (See section 2.6.5 for more details.)

This evaluation and selection process is described in greater detail in Chapter 2 of the OU-11 Baseline Risk Assessment report. The results of the COPC selection and concentrations used in the risk assessment for groundwater, surface soil and total soil at OU-11 are located in Table 2-1 through Table 2-3, respectively.

2.6.3 Exposure Assessment

This section presents the exposure pathways evaluated, the populations potentially exposed to the COPCs, the assumptions used to determine the chemical concentrations used in the risk assessment, and assumptions about exposure frequency and duration included in the exposure assessment.

2.6.3.1 Potentially Exposed Population

The specific receptors that were identified for the risk evaluation and that may be exposed to OU-11 site-related chemicals are the maintenance worker, construction worker, and resident. The maintenance and construction workers are exposed to soil only, whereas the resident is exposed to groundwater and soil. The maintenance/construction worker and resident exposure scenarios bracket the most likely future land use for OU-11

2.6.3.2 Exposure Pathways

Potential routes of exposure to soil for the maintenance worker and construction worker include incidental ingestion, dermal contact, and inhalation of fugitive dust.

Potential exposure pathways for the resident include ingestion of drinking water, inhalation of VOCs released during water use in the house, and dermal contact with the household water.

Routes of exposure to soil via contact in the lawn and garden include incidental ingestion and dermal contact. It was assumed that the residential soil is paved or vegetated, reducing the potential risk from inhalation of fugitive dust to insignificant levels.

2.6.3.3 Chemical Concentration Data

The concentration of a chemical in an exposure medium (e.g., soil or groundwater) that may be contacted by a receptor was estimated by using an upper confidence limit (UCL) of 95 percent based on the arithmetic mean or the maximum detected concentration, whichever was smaller. These values are identified as exposure-point concentrations and are presented in Tables 2-1 through 2-3. Exposure-point concentrations for the indirect pathways (e.g., inhalation of dust from soil or VOCs from water) are estimated using models that describe the transport of COPCs from the source to the exposure medium (e.g., soil or water).

2.6.3.4 Exposure Frequency and Duration

The resident was assumed to spend 350 days/year on-site (EPA, 1995) and remain in the same residence for 30 years. To be appropriately conservative, age-adjusted soil and groundwater ingestion factors, based on a receptor spending six years as a child and 24 years as an adult, were used in the groundwater and soil risk assessment to determine increased cancer risk. Children and adults were considered individually in assessing noncancer risks. Potential routes of exposure include incidental ingestion and dermal contact with soil, as well as ingestion, dermal contact, and inhalation of contaminants in groundwater.

The maintenance worker was assumed to be a 70-kilogram (kg) adult who works 8 hours/day, 5 days/week for a total of 250 days/year (EPA, 1991), remaining in this job for 25 years. Potential routes of exposure, limited to surface soil, include incidental ingestion, dermal contact, and inhalation of fugitive dust.

The construction worker was assumed to be a 70-kg adult who works 8 hours/day, 5 days/week for a total of 250 days/year (EPA, 1991). A construction job is assumed to last for 1 year and to involve excavation activities. Potential routes of exposure, limited to surface and subsurface soil, include incidental ingestion, dermal contact, and inhalation of fugitive dust.

2.6.4 Toxicity Assessment

The toxicity assessment provides information regarding the type and severity of adverse health effects that could result from exposure to COPCs and a measure of the dose-response relationship for each chemical. The dose-response relationships for oral, inhalation, and dermal toxicity are expressed quantitatively as reference doses (RfDs) and slope factors (SFs), corresponding to chemicals which have systemic (noncancer) effects and carcinogens, respectively.

2.6.4.1 Evaluation of Carcinogenic Effects

SFs, developed by EPA's Carcinogenic Assessment Group, were used to estimate increased lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, expressed in units of $(mg/kg\text{-}day)^{-1}$, were multiplied by the estimated intake of a potential carcinogen, in units of mg/kg-day, to provide an upper bound estimate of increased lifetime cancer risk. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this conservative-estimate approach makes underestimation of the actual cancer risk highly unlikely. Cancer SFs were derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

2.6.4.2 Evaluation of Noncarcinogenic Effects

Reference doses have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, at which adverse effects are expected to occur. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water per day and body weight) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (i.e., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse effects to occur.

2. 6.5 Risk Characterization

Increased cancer risks are probabilities that are generally expressed in scientific notation. An increased lifetime cancer risk of 1×10^{-6} indicates that an individual has a one in a million chance

of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. Increased cancer risks that are greater than 1×10^{-4} generally require a remedial action.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). An HQ of 1.0 is generally considered acceptable. The initial step in the risk assessment involves the comparison of chemical concentrations with risk-based screening levels, which are set at 1×10^{-6} for carcinogens and at an HQ of 0.1 for systemic toxins. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

2. 6.5.1 Summary

Risk characterization quantifies the cancer risk or noncancer hazard to each receptor. Three separate risk characterizations are performed for OU-11:

- Total site risk refers to the risk associated with all COPCs present on site.
- Site-related risk refers to the risk associated with COPCs present as a result of site-related activity; i.e., chemicals present at background concentrations are not included in this evaluation.
- Background risk refers to the risk associated with the COPCs that are present due to natural causes other than site-related activity. Concentrations of chemicals detected at the Site were compared to background concentrations in a statistical manner. Chemicals referred to as background are inorganics only.

Tables 2-4 through 2-7 summarize the results of the risk characterization.

Groundwater Evaluation. Groundwater at the Site is not currently being used for any purpose. OU-11 may be utilized as a recreational and wildlife management area in the future; however, the future land use of the Site is uncertain, and it is possible that permanent residences

one day could be located in the area. For this reason, risk associated with groundwater exposure by residents are evaluated. In addition, the goal of the Superfund program is to restore usable aquifers to their beneficial use.

Arsenic, lead, manganese, 1,2-dichloroethane, benzene, bromodichloromethane, chloroform, dibromochloromethane and bis(2-ethylhexyl)phthalate were identified as COPCs in groundwater (Table 2-4). Analytical concentrations of the inorganic chemicals are compared with background levels to determine whether their concentrations reflect site-related activities. The concentrations, of arsenic, lead and manganese were determined to be the same as background concentrations. Therefore, these chemicals are not considered to be Site-related contaminants. As noted in Table 2-4, when contaminants that are considered background are removed from the risk analysis, the Site-related cancer risk and noncancer hazard are within the acceptable limits.

Table 2-4 also compares the chemical concentrations in groundwater with EPA and West Virginia maximum contaminant levels (MCL) and other standards. Chemical concentrations are below MCLs (or other standards) for all chemicals except bis(2-ethythexyl)phthalate and lead. As noted above, however, the concentration of lead is less than background levels; therefore, the concentration in the groundwater is not attributed to Site-related activity. In addition, the dissolved form of lead (the toxicologically significant form) was not detected at all in the most recent round of groundwater monitoring conducted under the WVOW long-term monitoring program. Similarly, results from the monitoring program indicated that, while two of nine monitoring wells sampled detected concentrations of bis(2-ethylhexyl)phthalate, the levels detected (5.8 and 5.9 Fg/L) were below the MCL (which is 6.0 Fg/L). Finally, it should be noted that the total trihalogenated methane concentration (bromodichloromethane, chloroform, dibromochloromethane) is 1.3 Fg/L, which is less than the limit of 80 Fg/L established in the Safe Drinking Water Act proposed rule.

Surface Soil Evaluation. Based on the existing land use conditions at OU-11, the only plausible receptors exposed to surface soil are a hypothetical resident (Table 2-5), a maintenance worker, and a hunter/sportsman (Table 2-6). The risk posed to a resident or a maintenance worker is anticipated to be greater than the risk posed to a hunter/sportsman. For this reason, the hunter/sportsman scenario was not evaluated quantitatively. COPCs for both receptors have been identified as: aluminum, arsenic, manganese, benzo(a)pyrene, and dibenzo(ah)anthracene.

Table 2-4

Risk and Hazard Estimates for Groundwater Exposure (Resident)
OU-11, West Virginia Ordnance Works
Mason County, West Virginia

Chemical	Chemical Concentration (µg/L)	MCL [a] (µg/L)	Cancer Risk	Noncancer HI
Total Risk				
Inorganics				
Arsenic	32	50 [b]	7.18E-04	6.84
Lead	64.5	15 [c]	NA	NA
Manganese	833	ND [b]	NA	2.87
Organics				
1,2-Dichloroethane	0.6	5 [d]	2.27E-06	NA
Benzene	2	5 [d]	2.79E-06	NA
Bromodichloromethane	0.2	80 [b,e]	1.96E-07	0.000679
Chloroform	0.7	80 [b,e]	1.55E-06	0.00479
Dibromochloromethane	0.4	80 [b,e]	5.29E-07	0.00135
bis(2-Ethylhexyl)phthalate	48	6 [d]	2.87E-05	0.448
Sum			7.54E-04	10.2 [f]
Background Risk				
Inorganics				
Arsenic	39		8.69E-04	8.27
Lead	27		NA	NA
Manganese	824		NA	2.84
Sum			8.69E-04	11.11 [f]
Site-Related Risk				
Organics				
1,2-Dichloroethane	0.6		2.27E-06	NA
Benzene	2		2.79E-06	NA
Bromodichloromethane	0.2		1.96E-07	0.000679
Chloroform	0.7		1.55E-06	0.00479
Dibromochloromethane	0.4		5.29E-07	0.00135
bis(2-Ethylhexyl)phthalate	48		2.87E-05	0.448
Sum			3.60E-05	0.455 [f]

[a] MCL = Maximum contaminant level; from EPA (1996a), unless otherwise indicated.
[b] Requirements governing Groundwater Standards, West Virginia Code of State Regulations (WVCSR), Title 46, Series 12, 1993. No WVCSR MCL exists for this chemical.
[c] Defined by EPA (1996a) as an action level; identical to WV MCL (WVCSR, 1993).
[d] Identical to the WV MCL (WVCSR, 1993).
[e] Proposed rule; total trihalogenated methanes cannot exceed 80 µg/L.
[f] This sum overestimates total hazard because all COPCs included in the sum do not share a common target organ.
NA = Not applicable.
HI =Hazard index.
µg/L = Micrograms per liter.

Table 2-5

Risk and Hazard Estimates for Surface Soil Exposure (Resident)
OU-11, West Virginia Ordnance Works
Mason County, West Virginia

Chemical		Chemical Concentration (mg/kg)	Cancer Risk	Noncancer HI
Total Risk				
Inorganics				
Aluminum		11492	NA	0.155
Arsenic		9.2	2.30E-05	0.411
Beryllium		0.71	1.47E-05	0.00458
Manganese		653	NA	0.630
Organics				
Benzo(a)pyrene		0.195	2.22E-06	NA
Dibenzo(a,h)anthracene		0.13	1.48E-06	NA
	Sum		7.54E-04	1.20 [a]
Background Risk				
Inorganics				
Aluminum		13600	NA	0.184
Arsenic		13	3.25E-05	0.582
Beryllium		0.91	1.89E-05	0.00589
Manganese		687	NA	0.663
	Sum		5.14E-05	1.43 [a]
Site-Related Risk				
Organics				
Benzo(a)pyrene		0.195	2.22E-06	NA
Dibenzo(a,h)anthracene		0.13	1.48E-06	NA
	Sum		3.71E-06	0.000 [a]

[a] This sum overestimates total hazard because all COPCs included in the sum do not share a common target organ.
HI =Hazard index.
NA = Not applicable.

Table 2-6

Risk and Hazard Estimates for Surface Soil Exposure (Maintenance Worker)
OU-11, West Virginia Ordnance Works
Mason County, West Virginia

Chemical		Chemical Concentration (mg/kg)	Cancer Risk	Noncancer HI
Total Risk				
Inorganics				
Aluminum		11492	NA	0.00317
Arsenic		9.2	1.58E-06	0.00831
Beryllium		0.71	1.18E-06	0.000152
Manganese		653	NA	0.245
Organics				
Benzo(a)pyrene		0.195	1.25E-07	NA
Dibenzo(a,h)anthracene		0.13	8.36E-08	NA
	Sum		2.97E-06	0.257 [a]
Background Risk				
Inorganics				
Aluminum		13600	NA	0.00375
Arsenic		13	2.23E-06	0.0118
Beryllium		0.91	1.52E-06	0.000196
Manganese		687	NA	0.258
	Sum		3.75E-06	0.274 [a]
Site-Related Risk				
Organics				
Benzo(a)pyrene		0.195	1.25E-07	NA
Dibenzo(a,h)anthracene		0.13	8.36E-08	NA
	Sum		2.09E-07	0.000 [a]

[a] This sum overestimates total hazard because all COPCs included in the sum do not share a common target organ.
HI =Hazard index.
NA = Not applicable.

Table 2-7

Risk and Hazard Estimates for Surface Soil Exposure (Construction Worker)
OU-11, West Virginia Ordnance Works
Mason County, West Virginia

Chemical		Chemical Concentration (mg/kg)	Cancer Risk	Noncancer HI
Total Risk				
Inorganics				
Aluminum		12262	NA	0.0249
Arsenic		7.6	3.28E-07	0.0510
Beryllium		0.63	2.03E-07	0.000660
Manganese		294	NA	0.0443
Organics				
Benzo(a)pyrene		0.195	3.88E-08	NA
	Sum		5.69E-07	0.121 [a]
Background Risk				
Inorganics				
Aluminum		13600	NA	0.0276
Arsenic		13	5.62E-07	0.0874
Beryllium		0.91	2.93E-07	0.000953
Manganese		687	NA	0.104
	Sum		8.54E-07	0.220 [a]
Site-Related Risk				
Organics				
Benzo(a)pyrene		0.195	3.88E-08	NA
	Sum		3.88E-08	0.000 [a]

[a] This sum overestimates total hazard because all COPCs included in the sum do not share a common target organ.
HI =Hazard index.
NA = Not applicable.

Concentrations of the inorganic chemicals are compared with background levels to determine whether their concentrations reflect site-related activities. Concentrations of aluminum, arsenic, and manganese were determined to be the same as background concentrations. Therefore, these chemicals are not considered to be Site-related contaminants.

As shown in Table 2-5, when contaminants that are considered background are removed from the risk analysis for the resident, the Site-related cancer risk and noncancer hazard are within the acceptable limits. It should be noted that, for residential land use to occur, a future residence would have to be constructed, which would cause the mixing of surface and subsurface soil. In this situation, a resident would then be exposed to total soils. This scenario was not evaluated in the risk assessment. However, the concentrations of chemicals in the subsurface soil is less than that found in surface soils, indicating that taking exposure to subsurface soils into account would have little or no effect on the estimated risk to a future resident.

As shown in Table 2-6, cancer risk estimates for maintenance worker exposure to surface soil are well below the acceptable level of 1×10^{-4} for total Site risk, background risk, and Site-related risk. No HI exceeds the target level of 1.0 for the maintenance worker exposed to surface soil.

Total Soil Evaluation. A construction worker is the only receptor that is likely to be exposed to total (surface and subsurface) soils. The worker may be exposed to soils during demolition of existing structures and/or building of a new facility. See the discussion on residential exposure to total soils, in the previous section, for risk considerations in the event of exposure to total soils.

Table 2-7 presents the cancer risks and HIs for a construction worker exposed to total soil. All cancer risk estimates are below the unacceptable limit of 1×10^{-4}, and all HI estimates are below the limit of 1.0.

2.6.5.2 Total Receptor Risk

The maintenance worker and construction worker are exposed to only one medium–surface soil and total soil, respectively. The total risks estimated for these receptors, therefore, are the risks associated with exposure to one medium. As noted above, these Site-related risks fall within acceptable limits. The resident, however, is potentially exposed to two media–groundwater and

surface soil. Therefore, it is necessary to add the risks from exposure to groundwater with those from exposure to soil. Total cancer risk for the resident is 3.97×10^{-5}, the sum of the cancer risks from groundwater (3.60×10^{-5}) and surface soil (3.71×10^{-6}). Total noncancer HI for the resident is 4.55×10^{-1}, the sum of the HI from groundwater (4.55×10^{-1}) and surface soil (0.00×10^{0}). Total residential cancer risk and noncancer hazard from exposure to groundwater and soil are within acceptable limits.

2.6.6 Ecological Assessment

The potential risks to ecological receptors at the Site were evaluated in the Ecological Risk Assessment Screening Report Addendum for Area of Potential Environmental Concern 2 (APEC-2)., APEC-2 encompasses a number of sites of former operations at the WOW, including sellite manufacturing at OU-11. The ecological risk assessment evaluated the potential exposure of terrestrial wildlife and aquatic organisms to chemicals in soil, surface water, sediments, and the food chain. The ecological risk assessment concluded that the concentrations of chemicals present within APEC-2 were not sufficiently elevated to impair or disrupt the viability of terrestrial or aquatic populations, and recommended that no further evaluation of ecological risks be considered within APEC-2 of WVOW.

In summary, actual or threatened releases of hazardous substances from this Site do not indicate an imminent and substantial or future endangerment to public health and welfare or the environment; therefore, no remedial action is required at OU- 11.

2.7 Description of the No-Action Alternative

Capital Cost:	$0
Annual O&M Cost:	$110,000
Present N~orth Cost:	$476,245
Months to Implement:	N/A

No remedial action alternatives were developed for the Site. The No-Action Alternative is the preferred alternative because no remedial action is required to protect human health or the environment from chemicals in the soil and groundwater at OU-11. The risk to human health and the environment presented by OU-11 in its current state is within acceptable levels. As presented here, the No-Action Alternative consists of monitoring of Site groundwater annually

for a period of 5 years. After groundwater monitoring is completed, a review will be conducted to evaluate the trend of the concentrations for bis(2-ethylhexyl)phthalate and lead to assure that they remain within an acceptable range. If so, the approximate area bounded by Wadsworth Road to the north, the TNT Manufacturing Area to the east, the McClintic Wildlife Area Boundary to the south, and the South Acids Area to the west will be proposed for removal from the NPL (Figure 2-3).

Compliance with Applicable or Relevant and Appropriate Requirements.

Applicable or Relevant and Appropriate Requirements (ARARs) are categorized as chemical-, location-, or action-specific. Chemical-specific ARARs are health or risk-based concentration limits set for specific substances, pollutants, or contaminants. Location-specific ARARs address restrictions upon the concentrations of hazardous substances or the conduct of activities solely based on the CERCLA Site's location within an environmentally regulated region. ARARs that relate to a method of remedial response are termed action-specific.

The risk assessment for the Site concluded that the risk to human health and the environment was within acceptable levels; therefore, no remedial action is required for protection, and action-specific ARARs do not apply. Location-specific ARARs will be met without remedial action because the conservative residential scenario was considered during the risk assessment, and no restrictions on the land use was warranted based on the outcome of the risk assessment. Primarily, chemical-specific ARARs or to-be-considered criteria were evaluated. Chemicals detected at the Site were compared to applicable MCLs and RBSCs.

Two groundwater contaminants (bis(2-ethylhexyl)phthalate [DEHP] and lead) found at OU-11 were present at concentrations exceeding the applicable MCL and action level, respectively. DEHP was found at a maximum exposure level of 48 ppb (µg/L). The MCL for this contaminant is 6 ppb. However, the cancer risk associated with this compound for the receptors at the Site (2.9×10^{-5}) is well within the range of acceptable risk (1×10^{-4} to 1×10^{-6}). Furthermore, the total Site-related cancer risk associated with groundwater at this Site (3.6×10^{-5}) is within acceptable limits and is almost solely due to DEHP contamination. Since the risk assessment was completed, and during the pendency of this ROD, groundwater at OU-11 was re-sampled and the analysis indicated that the level of DEHP has decreased to 5.8 ppb.

The maximum exposure level of lead in groundwater was found to be 64.5 ppb. Although this value is in excess of the EPA (1995) action level for lead (15 ppb), lead contamination was detected in only three out of seven monitoring wells. The lead level was above the action level in only one of the three instances (64.5 ppb), and this detected amount corresponded to an unfiltered sample. Filtration of this same sample resulted in a detected lead level of 2.1 ppb, well below the action level. According to the Baseline Risk Assessment Report, the mean lead level (11.2 ppb) was less than the mean background level (13 ppb) of lead at the Site. The mean lead level for the Site was found to correspond to an acceptable probability (3.05 percent) that children's blood lead concentrations would exceed a level of concern as identified in the IEUBK Model for Lead in Children. (A probability of 5 percent or greater constitutes an unacceptable risk according to the IEUBK model.) For these reasons, neither DEHP nor lead are considered to be contaminants of concern at this Site, and the chemical-specific ARARs are met by this remedy.

2.8 Explanation of Significant Changes

The selected remedy is the same alternative identified as the recommended alternative in the Proposed Plan and that which was presented to the public at the public meeting held April 15, 1999, with one exception. The lead Agency (U.S. Army) no longer has firm plans to purchase the property and transfer it to the State of West Virginia for use as a wildlife management area. This future land use was described in the Proposed Plan, but due to complications related to fire damage, dilapidated buildings, and debris, it may or may not occur. A change in the future land use, however, does not affect the outcome of the risk assessment undertaken for the Site and considered in the decision to take no remedial action presented by this ROD because the risk assessment was conducted with the presumption that the Site could be used for future residential purposes.

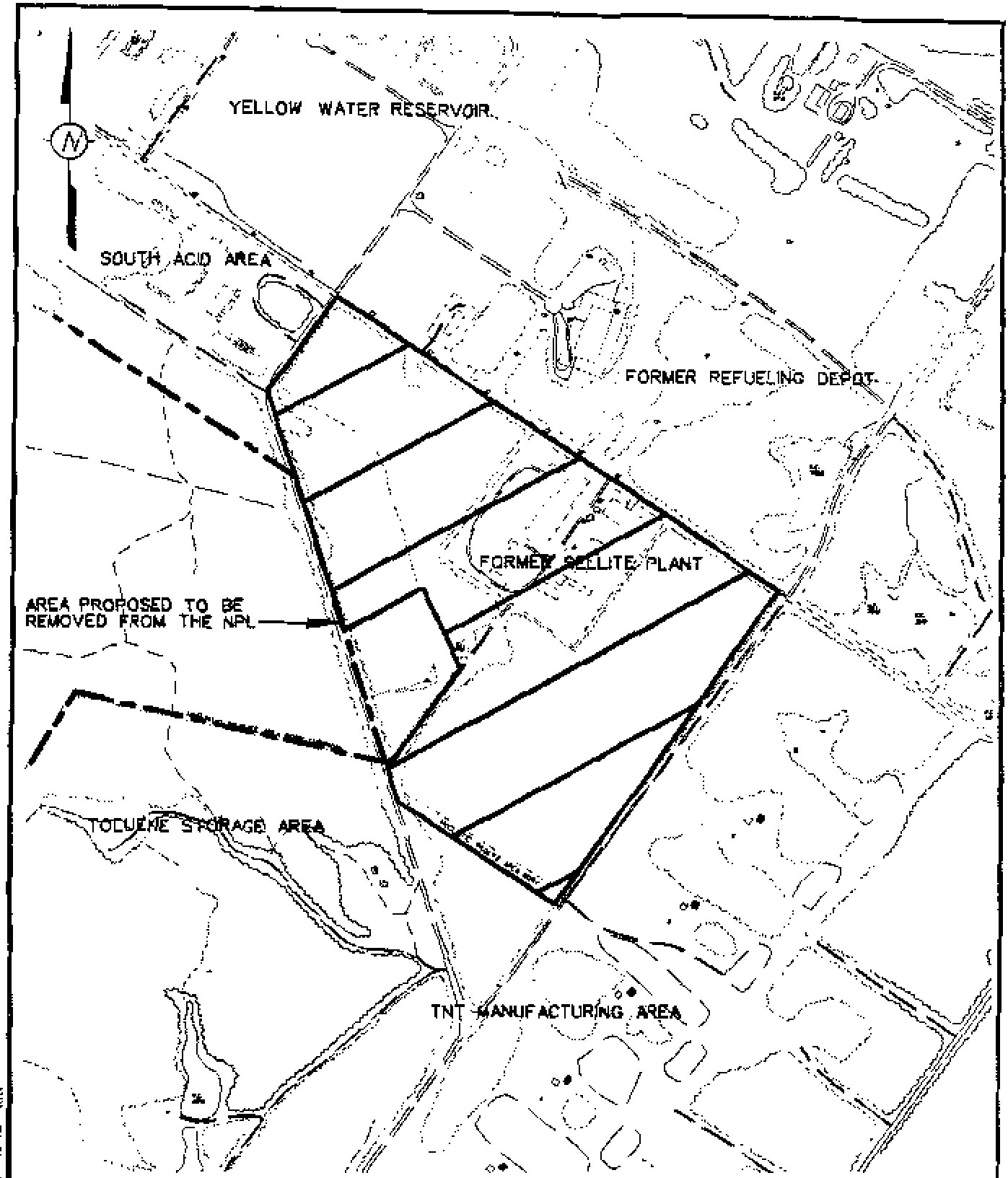

FIGURE 2-3
PROPOSED AREA TO
REMOVE FROM THE
NATIONAL PRIORITIES LIST

WEST VIRGINIA ORDNANCE WORKS
MASON COUNTY, WV

05/05/97 10:42 6NV

3.0 Responsiveness Summary

The purpose of this responsiveness summary is to provide the public with a summary of citizen comments, concerns, and questions relating to the Former Sellite Manufacturing area (OU-11). This summary details the USACE responses to these comments, concerns, and questions.

The selected remedy for the Former Sellite Manufacturing Area (OU-11) at WVOW is that no further action be performed at the Site, except for groundwater monitoring. As presented here, the No-Action Alternative consists of monitoring of Site groundwater for a period of five years. The WVDEP concurs that the selected remedy is protective of human health and the environment.

Community Involvement. Community relations activities for the final selected remedy include:

- A Restoration Advisory Board (RAB) was established for the WVOW. The RAB meets bimonthly to discuss the project status of each operable unit. The RAB includes representatives of the EPA-Region III, USACE-Huntington, the WVDEP, and the public. Meetings are typically held on a Tuesday night at 7:00 p.m. at the Mason County Public Library. The actual date of each meeting is determined at the close of the previous meeting.

- A copy of the RI report and the Proposed Plan were placed in a public repository at the Mason County Public Library in Point Pleasant, West Virginia.

- Newspaper announcements on the availability of the documents, the public comment period, and the public meeting were placed in the *Point Pleasant Register* on April 8, 1999.

- The USACE established a 30-day public comment period beginning April 15, 1999 and ending May 15, 1999 to present the Proposed Plan.

- A public meeting was held on April 15, 1999 to answer any questions concerning the Former Sellite Manufacturing Area and the selected remedy for the Site.

Representatives of the USACE, the EPA, and the WVDEP were available to the public at the Army National Guard Armory in Point Pleasant, West Virginia. No members of the public attended the meeting, nor were any comments received during the public comment period.

OPERABLE UNIT #11

(Former sellite manufacturing area)

PROPOSED PLAN
PUBLIC MEETING NOTICE

WEST VIRGINIA ORDNANCE WORKS
RESTORATION ADVISORY BOARD

The U.S. Army Corps Of Engineers (USACE) solicits input from the community on the preferred alternative for Operable Unit #11 (OU-11). The USACE has set a public comment period from April 15th to May 15th, 1999 to encourage public participation in the selection process. The comment period includes one public meeting at which the USACE will present the Proposed Plan, answer questions, and accept both oral and written comments. A public meeting is scheduled for 7:00 p.m. April 15th, 1999 and will be held at the Army National Guard Armory, located on State Route 1(formerly State Route 62), Pt. Pleasant, WV.

The Proposed Plan will be available for public review at the Mason County Public Library, located at 6th and Viand Streets, Pt. Pleasant WV. Library hours are from 10:00 a.m. to 8:00 p.m. Monday through Thursday, and from 10:00 am. to 5:00 p.m. Friday and Saturday (closed Sunday).

Comments from the public will be summarized and responses provided in the Responsiveness Summary Section of the Record of Decision (ROD). The ROD is the document that presents the USACE's final remedy for cleanup at the site. To send written comments or obtain further information, contact:

U.S. Army Corps. Of Engineers
Huntington District
502 8th Street
Huntington, WV 25701-2070
Attn: CELRH-DL-M (Mr. Rick Meadows)
Phone (304) 529-5388
Email: rickme@lrb.usace.army.mil
(between 9:00 a.m. and 4:30 p.m., Monday - Friday)

MEETING IS OPEN TO THE GENERAL PUBLIC